

**The causes, nature, and treatment of scurvy : a paper read before the
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THE
CAUSES, NATURE
AND
TREATMENT OF SCURVY.

A Paper read before the Covington and Newport (Ky.) Medical Society, by

CHARLES S. TRIPLER, M. D.,

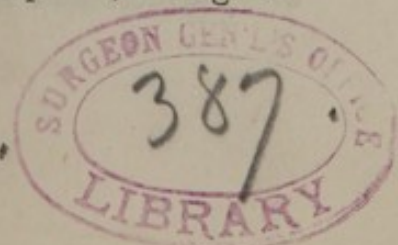
SURGEON, U. S. ARMY.

AMONG the many scourges that have afflicted the human race, and interposed serious impediments to the enterprises and progress of man, Scurvy must be acknowledged to occupy an important place. If civilization has followed or been promoted by conquest, and if the comfort, the happiness and the wealth of the world have been increased by the enterprise and the discoveries of the navigator, a fearful element of the cost of one and all of them must be conceded to be the ravages of this terrible disease.

When and where Scurvy first appeared, are matters of very little consequence. I shall occupy no more time upon its history, than may be necessary to elucidate or establish the practical view I propose to take of its etiology, pathology and treatment.

Scurvy, was very probably known to the ancients. A recent writer, in a monograph upon another subject, asserts that it was known to Hippocrates. This assertion, however, was made by others long ago; but Copland thinks, "there is nothing in his writings sufficient to warrant such an assumption; though in

presented by Dr. Kober.



describing *Eileos'aimatitēs*, he adduces the dark discoloration of the skin, the eruption of ulcers on the legs and the difficulty of walking as more particularly distinguishing it." Pliny says, that the army of Cæsar Germanicus after a long encampment in Germany, beyond the Rhine, were afflicted with a disease, in which the teeth dropped out and the knees became paralytic. A remedy for it was discovered in a plant not now known. I see no reason for doubting that this was Scurvy. I think, too, that Celsus alludes to something very like Scurvy as a species of Cachexia, for among the causes of the latter he remarks; "Aut quum inusitados et inutiles cibos aliquis assumpsit, aliquidve simile incidit. Huic præter tabem, illud quoque nonnunquam accidere solet, ut per assiduas pustulas aut ulcera, summa cutis exasperetur, vel aliquæ corporis partes intumescant." And, in speaking of the treatment he observes, "Prodestque jejuno prehendere per multas partes cutem et attrahere, ut relaxetur." Frictions, baths, the use of succulent food and wine, are also conspicuous among his remedies. This, however, is more curious than important. We know that when long voyages of discovery were first undertaken, the crews of the ships were decimated or rather almost swept away completely by Scurvy. Vascode Gama, who made the first voyage around the Cape of Good Hope, lost five-eighths of his crew by it. So in the earlier voyages to the coasts of North America, it made fearful havoc. Admiral Hosier, who commanded the West India fleet, in 1728, buried two crews from this disease. Lord Anson lost four-fifths of his men in two years from the same cause. But it has not been the crews of ships alone that have been its victims, nor has the sea been the solitary scene of its devastations. There can be little doubt it has always prevailed among the people living about the Northern seas. Olaus Magnus in his history of the Northern nations, describes it, and Wierus mentions it as a disease peculiar to that climate, as he had never seen it in Southern Europe, Asia or Africa. The early visitors to Hudson's Bay, and the early French settlers in Canada, were great sufferers from it, every winter and spring. We have also numerous records of

its prevalence in besieged towns, and even in besieging armies in the winters and springs; as in the siege of Breda in 1625. At the siege of Thorn in Prussia in 1703, five thousand of the garrison perished of Scurvy in five months. In the Austrian army in Hungary, in the winter of 1720, many thousands of the soldiers died. After the capture of Quebec, in the spring of 1760, one thousand of the British garrison died of Scurvy. In our own service, great ravages have been made by it from time to time, but always under similar circumstances. In 1809, we lost six hundred men on the lower Mississippi from Scurvy. In 1820, when a large force was sent to Council Bluffs and wintered there, we lost one hundred and sixty-eight men from it, and there were at the post more than five hundred cases. At the establishment of Fort Snelling, near the Falls of St. Anthony, our men also suffered severely. In the Florida war we were a good deal annoyed by it, and it also appeared among the Indians within our lines. Among the earlier miners in California it was also very troublesome. Dr. Kane records suffering from Scurvy among his crew in his last Arctic expeditions, the disease appearing in the winter, disappearing with the spring, reappearing the succeeding winter, and becoming mitigated as the season advanced.

I have adduced these facts out of the many recorded, solely with a view of finding a clue to the etiology of the disease. I think they are sufficiently varied as to time, place and circumstance, to enable us to form some logical conclusion as to this matter. If we can find some hygienic conditions common to them all, we shall not err much in admitting these to be the essential causes of Scurvy.

A distinction has been made between land and sea Scurvy, and Surgeon Foltz of the U. S. Navy, even insists that they are different diseases. In their symptoms, he says, "there is in their earlier stages, a slight assimilation, but as they progress, in their pathological characters they are perfectly dissimilar." Good describes land Scurvy under the title of *Porphyra Hæmorrhagica*, and considers it identical with the *Morbus Maculosus* of Werlhoff; and then he gives to sea Scurvy the

name of *Porphyra Nautica*. His nosological definition of land Scurvy is, "spots of different sizes ; often in stripes or patches, irregularly scattered over the thighs, arms and trunk ; occasional hæmorrhages from the mouth, nostrils or viscera ; great debility and depression of spirits." He defines sea Scurvy by "spots of different hues intermixed with livid, principally at the roots of the hair ; teeth loose, gums spongy and bleeding, breath fetid, debility inveterate and extreme." Dr Foltz says, in the land Scurvy as it prevailed among the marines, who had served in the Florida war, and had afterwards fallen under his observation at the Marine Barracks at Washington, that Nyctalopia was a common symptom. I think this distinguished surgeon was betrayed into error in this observation through that besetting sin of our profession, hasty generalization. If he had said it was a common complication in that particular instance, it would have been in our opinion nearer the fact. Nyctalopia is of frequent occurrence among troops in the field, particularly in southern climates, and numerous cases were observed among our men in Florida, but totally independent of scurvy. I cannot call to mind a single instance in which the two affections were combined in the same individual, as having occurred under my own observation. Dr. Foltz continues "*Purpura, œdema, the cadaverous and foetid effluvium which follows the extreme emaciation, the fainting upon the slightest exertion, and the extent of disease in the respiratory system, which always occur in the scurvy on board ships, are never met with in the land scurvy. In the latter, we have sponginess of the gums, ulceration which terminates in dysenteries and fevers, the first induced by a cachectic diathesis, but never involving that complete anæmia of the blood, which amounts to a universal septic tendency.*" Without stopping to enquire the grammatical import of "*Anæmia of the blood,*" we remark that the differences here enumerated, if conceded to exist, are differences only of degree and not of kind. The phenomena are plainly identical in nature, and as plainly dependent upon an identical pathological condition. But it is *not* conceded that the aggravated signs *always* exist in sea scurvy, or that they are never seen in land

scurvy. Surgeon Moore of the army, in his report of the diseases at Forts Kearney and Laramie in 1850, says, "Scurvy has increased to a much greater degree than was anticipated. Thirteen of the cases were very severe, attended with great lassitude, stiffness of the feet and knees; respiration difficult upon the slightest exertion; the countenance exhibiting a pale, sallow, and bloated appearance; maculæ first in the legs, then thighs and arms; oedematous swellings of the legs, and extensive anasarcaous effusions; the gums spongy and tender, and apt to bleed upon the slightest touch; the urine turbid and dark colored; the muscular power much prostrated; the blood dissolved. Indurations of the muscles and severe pain in the thighs, back and knees, were frequent. In some of the cases, pain in the intestines and constipation; extensive subcuticular extravasations of blood, on the extremities and other parts of the body; passive hemorrhages from the gums and nose; the gums separating from the teeth, and the teeth becoming loose in their sockets. In the fatal case, extreme prostration occurred, with anxious and oppressed respiration, dysenteric discharges and convulsions."

Here we have all the characteristics of sea scurvy, as so forcibly depicted by Dr. Foltz, and occurring a thousand miles away from the sea. Land scurvy as observed by Dr. Foltz in Florida and at Point Isabel, was the effect of a less complete, less rapid, and less protracted application of the scorbutic generators, than usually obtains at sea. Hence a milder form of the disease, and herein is the only difference. The complications of scurvy, due to accidental morbid influences, independent of the disease itself, are frequently and even generally described with scurvy, and give rise to much confusion. Scurvy, we consider to be a simple pathological condition—a disease certainly, but very frequently, a mere *basement* disease. not inconsistent with, but very commonly predisposing to other distinct diseases, so that it is seldom seen uncomplicated, and hence its protean forms and diversified histories. The disease, as described by Dr. Kane in his last work, is singularly identical in every feature, with that recorded by Dr. Moore; Dr.

Moore's occurring on land in the interior of Nebraska Territory, and Dr. Kane's on ship board in the arctic ocean. I have seen and treated both forms of the disease, and can only say in reference to it, that if there be a distinction, I have never been able to detect it.

From the fact that the first scurvy of which we have authentic accounts occurred at sea, and the further fact that the diets of the navigator, differed from those of the landsman principally in the substitution of salt meat for fresh, it was naturally inferred that the use of salt meat was the cause of the disease, that it was due to the use of an excess of salt. Such was Cullen's opinion. Dr. Good assigns as its causes, poor diet, impure air, anxiety of mind, and sedentary mode of life. Dr. Budd, after elaborate investigation and comparison, concludes that the essential cause of scurvy, is the want of fresh succulent fruit and vegetables. He found that wherever scurvy prevailed, this deficiency existed and it never prevailed when these things were to be had. These are strong points, but one more fact is wanting to make the logic conclusive, and that is that scurvy should always prevail when fruit and vegetables were wanting, and that all classes subjected to the same privations, should be affected in similar ratios. Dr. Wood makes the important remark, that, "Meat whether fresh or salt, cannot be the cause of the disease, for it is sometimes produced when little or no meat is furnished, as among the people of India, when confined in hospitals or prisons, and fed upon rice and other farinaceous products." He adds that he "has witnessed a case of the disease in a young lady, who was confined for a long time, for the cure of an obstinate diarrhoea, to a diet exclusively of barley." He mentions another case induced by a restricted diet too long kept up under medical advice. Copland remarks, "That salted meats are not more productive of scurvy than fresh meats, or at least not much more so, is shown by the prevalence of the malady, in the spring of 1720, in an army which Kramer stated to have enjoyed an abundance of fresh meat at a low price; in the Russian armies in 1736, which were similarly circumstanced; in the French prisons of the last century, who had

no salt provisions; and the regiments at the Cape in 1836, that enjoyed an abundance of fresh meat." We have mentioned the prevalence and fatality of scurvy at Council Bluffs in 1850. Dr. Gale of the army, who was one of the medical officers in charge of those troops, remarks that the men were without other articles of subsistence than salted or smoked meats without vegetables or groceries. The winter had been severe, and the men hard worked. The scurvy appeared in January, and prevailed till April, when wild onions appeared, and the disease was checked at once. But the disease was confined to the men in camp. A small detachment that was kept out in the woods or subsisted itself by hunting, escaped the disease. Dr. Kane calls fresh raw walrus and bear meat a specific. Whenever he could procure these in his dreary Arctic imprisonments, his men revived—the scurvy was immediately checked—the effects were visible in a few days. The Esquimaux, his neighbors never tried it at all, though as to other influences, their circumstances did not differ from his. Now the Esquimaux had no vegetables, nor did the detachment in the woods at Council Bluffs, yet both escaped scurvy. We conclude then, that neither the privation nor the abundance of fresh meat, will prevent or induce scurvy, nor will the privation of succulent vegetables always induce it. There is no instance on record, so far as I know, where scurvy has prevailed to any extent when succulent vegetables were abundant. I think, however, I have seen a few sporadic cases, where vegetables, such as potatoes were accessible, though whether the individual affected, had partaken of them or not, I am not prepared to say. I think it possible, however, that in individual instances, from the accidents of disease, the assimilative function may be so illy performed, that the principles furnished to the economy from the vegetables, may not be absorbed, or not in such a shape as will admit of their entering into those combinations upon which their utility depends.

Upon a review then, of all the facts before us, what common principles prejudicial to health, seem to pervade them all?

In the first place it will be remarked, that the disease first

appears after exposure for some length of time, to a comparatively low temperature. In all the instances we have adduced, where the time is mentioned at all, we find it to be late in the winter and so on to spring. At Council Bluffs, at Fort Snelling, in Florida, at Point Isabel, in Dr. Kane's expedition, &c., this seems always to obtain. I have never heard of the disease within the tropics. A reduced temperature then for a considerable length of time, I consider an essential element in the production of scurvy. This temperature is not to be measured by thermometrical degrees, but is to be determined relatively to the habits of the individual. The Esquimaux did not suffer from scurvy, while Kane's party did. There was more scurvy relatively among the Seminole Indians, within our camp at Tampa Bay in '36 and '37, than among our men.

The influence of diet is next to be considered, and here I think we shall find that defective nutrition, either qualitative or quantitative or both, is an essential element, and this too is to be determined within certain limits, by the normal habit of the individual, and that any cause that seriously impairs digestive power and normal assimilation may produce it.

That qualitative deficiency of nutriment, is an important generator of scurvy, appears at once by reference to most of the instances we have adduced. All writers agree upon this point. The salted meats that formed the basis of the diets at sea during the sieges, at Council Bluffs and Fort Snelling, are at once referred to by the historian, as causes of the disease. Cullen, as we have seen, considered an excess of salt, as *the* cause of scurvy. Yet we have the cases of the French prisoners and the regiments at the Cape, who had abundance of fresh meat, but that did not prevent scurvy. Something else then besides the salt must be sought for as the deleterious principle. If salt meat have any agency in the production of scurvy, it must be owing to its deficiency in some of the elements essential to the formation of healthy blood, or that these elements exist in such a form, as to make them unavailable, either from the presence of counteracting or neutralizing elements, or from the inabilities of a debilitated digestive apparatus to assimilate them in that

form. We know that beef, venison, and the like, do contain all the elements of a normal hematosiis. "Muscular flesh," says Magendie, "in which gelatin, albumen, and fibrine, are combined according to the laws of organic nature, and when they are associated with other matters, such as fats, salts, &c., suffices even in very small quantities for complete or prolonged nutrition." Dogs fed solely for 120 days on raw meat from sheeps heads, preserved their health and weight during this period; their daily consumption never exceeding 300 grammes, and often being less than this quantity. But 1000 grammes of isolated fibrine, with the addition of some hundreds of grammes of gelatine or albumen, were insufficient to support life. "What then, says Magendie, is the peculiar principle which renders meat so perfect an aliment? Is it the odorous and sapid matter which has this function, as seems probable? Do the salts, the trace of iron, the fatty matters, or the lactic acid contribute to the nutritive effect, notwithstanding that they constitute so minute a portion of meat? We shall endeavor to answer these questions presently. We merely say now, that we do not think the osmazome the principal of these nutritive agents as Magendie supposes to be probable. But to return to salt meat, we remark, in the first place, that according to Beaumont, it required four hours and fifteen minutes for chymification, while fresh beef required but three hours roasted or boiled. An important difference in readiness of assimilation may be found here, and we cannot deny the probability at least of such chemical change having taken place, as regards the salts, iron, &c., by the process of salting, or the age of the material before it is used under those circumstances, when scurvy has resulted, as to have seriously impaired its nutritive properties.

It has also been well remarked, that it is impossible to judge from the salt beef, what may have been the quality of the beef before it was salted. It is well known, that "the salted provisions supplied to ships, have frequently been long cured, even before they are received on board, and are often of the most inferior and unwholesome character." The same remark applies to the salted provisions furnished to the army, whether

procured by contract or purchased by the Subsistence Department in the markets. Tons of such provisions have been condemned within my own knowledge, and where troops have been so situated as to make it a matter of necessity to use them, or go without animal food, as at Council Bluffs and Fort Snelling, we need not wonder that cachectic disease followed. The remainder of the rations of the soldier is beans, rice and wheat flour. The supply of these are abundant, and they are among the most nutritive of all vegetable substances. Nevertheless they fail qualitatively as to certain normal blood principles, which principles are those we find wanting in the blood of the scorbutic. Beans contain abundance of nitrogen and carbon, but no iron and mere traces of potash, and the same is true of wheat and rice. Hence these afford abundant aliment for respiration, and theoretically they should be sufficient for nearly all nutritive purposes. But they do not prevent scurvy, because they are qualitatively defective.

I have not time, nor is it necessary to dwell much upon quantitative deficiency. It is plain, that if certain principles are necessary at all, unless the supply of these principles is in quantity adequate to the demands of the system, pernicious results must ensue; but to show that the determinate form of their result, may be that of scurvy,—I quote this fact, the inspector of the British prisons, says in one of his reports in relation to the Lewes House of Correction, "Scurvy at one time prevailed in the prisons; by an increase of diet, it disappeared. The diet was again diminished, and the scurvy again appeared. The diet was then permanently increased; the scurvy again disappeared, and has not since occurred." In death from starvation, so far as I am informed, scorbutic indications do not appear. But, in this case the blood is not renewed at all from without, and will be deficient in all its constituents, whereas in scurvy, we find fibrine and albumen in excess, they being products of the diet upon which the scorbutics have been sustained.

Two other causes have an important and conspicuous part in the production of scurvy, *generally*, but not always. Impure air, and depressing emotions; the latter being sometimes a

cause, and sometimes an effect, but being present in one or the other relation in all cases. When among the scorbutic, exhilarating circumstances occur, and pleasureable emotions are excited, a marked improvement is always seen.

Such being our views as to the essential causes of scurvy, we now proceed to inquire into the manner in which these act upon the animal economy, in the production of the disease, and we are naturally led at once to a consideration of changes that should and do and exist in the blood. The general remark of Poupert, Lind and others, "that the blood found in the cavities of the heart or vessels after death, was remarkably altered, fluid, broken down and presented more or less of a greenish black hue," teaches us nothing. The same may be said of the blood in a dozen totally different cases. What one wants is accurate analysis as to every constituent of the blood. I do not think we have that yet; the best and most recent we have are those of Mr. Busk, which I transcribe from the Sydenham Society's edition of Simon's chemistry. They were made in three cases that occurred in the Dreadnought Hospital Ship, and are as follows:

	Healthy Blood.			
Water,.....	849.9	835.9	846.2	788.8
Solid Constituents,.....	150.1	164.1	153.8	211.2
Fibrine,.....	6.5	4.5	5.9	3.3
Albumen,	84.0	76.6	74.2	67.2
Blood Corpuscles,	97.8	72.3	60.7	133.7
Salts,.....	9.5	11.5	10.9	6.8

We have also in the same work, an analysis of the sanguineous fluid discharged from the mouth of a young woman, the subject of the morbus maculosus, or land scurvy. The "fluid contained much saliva, and some flocculi of mucus, but no fibrine." "The decanted fluid exhibited no blood corpuscles under the microscope, and only a few membranous granules. The sediment was composed of blood corpuscles, which for the most part were changed from the flattened into a spherical form, and of which a small quantity were of a pale yellow color, while the majority were almost if not quite colorless." After thoroughly

stirring the fluid, it was boiled, upon which it coagulated perfectly." It was composed of,

Water,	948.889
Solid residum,.....	31.111
Fat,	1.377
Albumen and mucus,.....	34.032
Globulin,.....	5.610
Hematin,.....	0.102
Alcohol extract Biline salts,.....	4.635
Water extracts ptyaline and salts,.....	2.355
Biliverdin,.....	0.366

With regard to these analyses, we remark that in healthy blood, .63 of the solid constituents are blood discs, and that they very much exceed the albumen in quantity. In the three fluid cases, the blood discs are not quite .45 of the solid constituents, and in the last but .1, and in all are much less than the albumen. The albumen and fibrin in the three first are in excess, as compared with healthy blood. The salts we also find increased in the scorbutic, but unfortunately we are not informed as to the absolute or relative quantities of each, a circumstance much to be regretted in view of the interesting researches of Dr. Garrod. In respect, however, to the normal quantities of the salts in blood, I have given above only Busk's table. Simons and Denis's differs essentially—the mean result of ten analyses of venous blood, gives 11.1 in 1000, and these consisted of carb. soda, 1.6; Chlor. Soda, 4.4; Chlor. Potas., 2.7; Carb. Lime, 1.8; Phos. Lime, and traces of Phos. Magnes., 0.5. Dr. Garrod has found that the blood of scorbutic patients, contained little more than one third of the amount of potash, that is contained in healthy blood. We conclude then, that the blood of the scorbutic is deficient in globulin, hematin and potash, and that it contains fibrin and albumen and perhaps soda in excess. We may still further simplify these results, by reducing them to a deficiency of iron and potash, and an excess of nitrogen and carbon, and these must be the qualitative and quantitative errors in the dietaries, that induce scurvy; and these conclusions we think are remarkably confirmed by recorded and well authenticated facts and observations. The limits of this paper will not admit of our adducing these facts in this place, and in

this connection ; several of them have been already stated, and others will be incidentally referred to, in what we shall have to say of the treatment of scurvy, to which we now proceed.

I am not professing to write a complete treatise upon scurvy, and of course I shall not mention even by name one tenth part of the numerous substances that have been found useful in the prevention and cure of the disease. Two, apparently antagonistic classes of remedies, however, being most conspicuous among them all, and the efficacy of each being generally attributed to, or explained by the preponderance of one or the other principle in the particular article proposed, I shall almost confine myself to the consideration of the representatives of each class. These are the vegetable acids and the alkalies, or rather *the alkali potash*—and first of citric acid. Lemons, limes, &c., were early known as preventives of scurvy, certainly as early as the 16th century. But it was not till the time of Lind, in the middle of the 18th century, that public attention was directed to these fruits, for the cure and prevention of scurvy, and even then they were not introduced into the British Navy, until Sir Gilbert Blane and others, had reinforced Lind's views. Since the use of lemon juice, has been in general use in the navy, scurvy has become an historical disease, and by most writers or observers, it was for a long time considered a specific. Dr Watson says, "Lemon juice is really a specific against scurvy, whether it be employed as a preventive or a remedy." Dr. Good remarks, "Of all the antiscorbutics, however, that have thus passed under our survey, the citric acid, or that of lemons, is the only one that can make an approach towards the character of a specific for sea scurvy; and how well entitled this medicine is to the maintainance of such a claim," * * * "the triumphant narrative of Dr. Baird will sufficiently convince." Dr. Baird's narrative relates to the cure of an existing scurvy, and the prevention of it afterwards, in Lord St. Vincents channel fleet in 1801, composed of 24 sail of the line. Scurvy broke out and spread rapidly through the fleet in a fortnight after sailing. They continued at sea 17 weeks, had not a single fresh meal in all that time, and no other antiscor-

butic than lemon juice. When they reached port, there was not a single case of scurvy. These are strong opinions and facts, and if there were none on the other side, they might be admitted as conclusive. Dr. Bence Jones explains the effect of the class of which this acid is the representative in this way, "By diminishing the amount of alkali in the blood, and by giving non-nitrogenous food, scurvy is cured or prevented, in consequence of such substances being acted upon instead of the tissues of the body. No other explanation can be given of the benefit which arises from vegetable acids, from fresh vegetables, from sugar, wine, beer, wort, treacle, potatoes, &c., all of which have been used with the best effects." Dr. Baily attributes the action of potatoes, a most unquestionable antiscorbutic, to the vegetable acids they contain. He says, as quoted by Watson, "A glance at the chemical analysis of the potatoe at once explains its antiscorbutic virtue. The various fruits, succulent roots or herbs, which have the property of preventing and curing scurvy, all contain, dissolved in their juices, one or more organic acids, such as the citric, tartaric, or malic acids. Sometimes these acids exist in the free state, but more generally they are combined with potash or lime, or with both these bases." "As to potatoes, Vauquelin found the acid to be the citric in combination partly with potash or lime, and partly in a free state." The farinaceous seeds, as wheat, barley, oats, rye, which are destitute of anti-scorbutic properties, contain no organic or vegetable acids." He might have added nor potash either. It cannot be disputed, that lemon juice is a most important antiscorbutic, whatever may be the explanation of its action. But it is certainly *not* a specific, as the following facts will show. In the year 1822, his Majesty's ship *Leander*, sailed from Trincomalee for the Cape of Good Hope, taking on board the mechanics of the Dock Yard establishment, then reduced on the island. There were also embarked 26 invalids, and all the sick that could be removed from the hospital. These invalids and sick were principally affected with chronic hepatitis, dysentery, and phthisis pulmonalis, all of which, (even some who were expectorating large quantities of purulent matter), recovered on the passage to the Cape. This good fortune was coun-

terbalanced by scurvy, which broke out among the crew, and in spite of large quantities of lemon juice, plentifully administered, in conjunction with every other antiscorbutic, which the ship could produce, spread to an alarming extent, and in one case proved fatal. Had they not reached the Cape at the time they did, the *Leander* would have presented as deplorable a spectacle as the *Centurion* at Juan Fernandez, notwithstanding the supposed infallible specific lemon juice, which in no instance, on board the *Leander* had the slightest effect in even checking the ravages of the scurvy." *Johnson's M. C. Review*, 1824.) We may add that careful analysis of this lemon juice in London, showed it to be perfectly good.

This is a remarkable failure of the prophylactic or remedial powers of lemon juice, and at once destroys its claims to being a specific. It may be susceptible of explanation. It is known that the acid fruits themselves, are superior in efficacy to their juices; that the juices, however well preserved are the more efficacious as they are more recently prepared. It is possible, then, that this lemon juice, though apparently in good condition as an acid, may have lost some other principle by age. Fresh lemon juice is not *all* citric acid.

The representative of the alkaline remedies is potash. Dr. Garrod, of London, was the first to suggest potash as a remedy for scurvy. He deduced his conclusions from these facts, "That in all scorbutic diets, potash exists in much smaller quantities than in those which are capable of maintaining health." Upon this I remark, that in the farinaceous foods, there are mere traces of potash, that in salted meats by age, and the presence of soda, potash is lost by exosmosis. Dr. Garrod, himself says: "If we estimate the amount of potash taken by the inmates of this workhouse, (Credition Union), we shall find the men's food to contain about 186 grains, and the women's about 181 grains weekly. This amount would be much influenced by the mode in which the potatoes were cooked; if not too much boiled, and with the skins on, they would contain a much larger amount of potash, than if boiled without their skins and much done. Under this diet, the inmates remained healthy; but owing to the scarcity of potatoes, boiled

rice in equal weights was substituted, and in a few months the inmates became scorbutic. When the change was made, the weekly amount of potash taken by the men was about 51 grains, and by the women 46 grains, or a reduction of more than two thirds took place. Rice and potatoes do not differ much in their composition, except in salts of potash contained in the latter. In the weekly diet list for the military prisoners at the Millbank Penitentiary, where they were subject to scurvy, we find the amount of potash taken by each prisoner during the first three months of imprisonment, to be about 44 grains; during the second three months, about 50 grains; after six months, about 68 grains. At present when potatoes are added, the weekly amount of potash is from 210 to 230 grains, and no case of scurvy has arisen since the change."

2d. All bodies found to be antiscorbutic, contain a large amount of potash. In proof of this, Dr. Garrod adduces the fact, that "all fruits contain this substance in abundance, as oranges, lemons, limes, grapes, gooseberries, &c." "Potatoes contain a very large amount of potash, and when boiled, (not too much and unpeeled), still retain most of that ingredient; this also accords with the fact, that potatoes, when cooked in the ordinary way, are antiscorbutic, and at the same time explains why the hard core of that tuber, which is so much liked by the Irishmen, is most powerful in preventing the occurrence of scurvy."

3d. Scorbutic patients, when kept under a diet, which gave rise to the disease, recover when a few grains of potash are added to their food. Dr. Garrod supports this position, by the fact of several cases under his own care, recovering under the use of some salt of potash mixed in syrup or water; and he says, "When the cases were thus treated, all vegetables, milk, or malt liquors were strictly prohibited." To this I add, that after the suggestion of Dr. Garrod, Asst. Surgeon, W. A. Hammond of the army, treated scurvy successfully in New Mexico, with carbonate and bitartrate of potas. It was impossible to procure fresh vegetables at his post at the time, so no error of observation could have arisen from that source. Another accom-

plished young gentleman in the Army Medical Staff, told me he had treated a severe outbreak of scurvy among a detachment of troops under his charge, on an expedition toward the Sierra Nevada, with iodide of potash and successfully. In this instance, there could have been no change of diet, for the men were subsisted upon the provisions they took with them, and had access to no others. Under my own observation, sea scurvy has also been successfully treated with the carb. potash. While I was in San Francisco, a British merchantman arrived at that port, with six or seven of the crew down with scurvy, in a most aggravated form. The surgeon of the British Hospital asked my advice as to their treatment, and I recommended Garrod's plan. They were treated with ten grain doses of bicarb. potas, frequently repeated, and with immediate relief; all recovered and rapidly.

According to Liebig, one pound of beef is equal to ten and one half of potatoes in nutritive power. Playfair's analysis of beef, gives 4.42 per cent of ashes. Liebig gives the proportion of lactate and phosphate of potash and common salt, at $\frac{1}{2}$ per cent. Supposing the potash to be one half of this, if a man should consume seven pounds in a week, he would have been furnished with 133 grains of potash, which is enough, according to Garrod's views to prevent or cure scurvy. Now fresh animal food has been more than once shown to be a preventive and cure for scurvy. As for instance, in the scurvy at Council Bluffs. And more recently we have Dr. Kane's testimony to the same fact. "Our sick," he says, "are languishing for want of fresh food. It is the only specific; I dislike to use the unphilosophical term; but in our case it is the true one. In large quantities it dissipates the disease, in ordinary relations it prevents its occurrence, in small doses it checks it while sustaining the patient." That scurvy should depend upon a deficiency of potash in the food, and as a consequence in the blood, seem never to have occurred to pathologists, until suggested by Dr. Garrod; it is not surprising, therefore, that accurate quantitative analyses of this ingredient are not reported. We find the different salts announced en masse. As to the disease under

consideration, attention has been rather diverted from, than directed to this point, from the fact that fresh fruits were its earliest ascertained antidotes; and in these the acid being the most marked principle, it was empirically assumed to be the curative one. Garrod, however, declares that the result of his analysis, that scorbutic blood contains but a little more than a third of the potash contained in healthy blood. This has been now nearly ten years before the profession, and I am not aware that the fact has been disputed. It is certainly a very important one, and ought to be placed, if it is not already beyond a doubt. Now then, as all the antiscorbutics are shown to contain potash in very sensible or even considerable quantities, and some of them certainly do not contain the vegetable acids, Dr. Kane's Walrus beef for example, and as the blood of the scorbutic is also deficient in potash, we are justified in believing that a diet deficient in potash, does produce scurvy, and that the want of vegetable acids does not.

But we have also found that there is a deficiency of iron in scorbutic blood; hence iron should be applied as a preventive and a remedy. In the vegetable acids it does not exist, in fresh beef or fresh animal fibre, it does; and it has also when directly given, been found an important remedy. I quote again from the lamented Kane, "Among other remedies which I oppose to the distemper, I have commenced making sundry salts of iron; among them the citrate and a chlorohydrated tincture. We have but one bottle of brandy left; my applying a half pint of it to the tincture, shows the high value I set upon this noble chalybeate. My nose bled to-day, and I was struck with the fluid, brick dusty poverty of the blood. I use iron much among my people; as a single remedy, it exceeds all others, except only the specific of raw meat. Potash for its own action is well enough to meet some conditions of the disease, and we were in the habit of using freely an extemporaneous citrate, prepared from our lime juice; but as our cases became more reduced and complicated with hemorrhage, iron was our one great remedy."

We know that iron is contained in most articles of food. It is certainly a constituent of the blood found in meat—raw

meat recollect was Dr. Kane's Specific,—traces of iron have been detected in Potatoes, in mustard, (Capt. Parry managed to cultivate mustard, as an antiscorbutic in the cabins of his ships), and in cabbage; all important antiscorbutics. But these substances all contain the potash as well, and certainly combine the two elementary constituents we have seen to be deficient in the blood of the scorbutic. Assembling these observations, they seem to converge to this point—that scurvy requires for its prevention and cure, aliments and remedies that contain both potash and iron. If this be so, is it not probable that the potasso tartrate of iron will be found the simplest and most efficient antiscorbutic?

A few words upon the complications of scurvy and I have done.

We have already said, that we consider scurvy as a simple pathological condition, not opposed but frequently predisposing to other forms of disease, and that these concurrent or intercurrent diseases, have when observed, been frequently erroneously described, as belonging to the simple basement disease. An instance of this has already been noticed in Dr. Folz's account of the scurvy, viz: The Nyctalopia, he observed, among the scorbutic marines from Florida. Dr. G. B. Wood, has adopted this error, and remarks upon the authority of others, that Nyctalopia has been occasionally observed as a commencing symptom. There are several complications of scurvy, that have been already observed, and no doubt others remain to be recorded. Among those usually seen we may mention intermittent and typhoid fever, rheumatism, dysentery, and thoracic inflammation. I have seen fatal dysentery and pleuro-pneumonia supervening upon scurvy, and rheumatism is not at all uncommon in these patients. But these are totally independent of the scorbutic condition, as every one will readily admit. But a singular error of this kind has recently been rather elaborately advocated by Dr. M. L. Knapp, in a monograph, entitled "An inquiry into the cause and nature of nursing sore mouth." The author, by some means or other, has persuaded himself, that the disease is scurvy. In support of his speculation he adduces several cases,

the first occurred in a woman in Illinois, in 1835; "the memorable year of scanty vegetables, and lamentable state of public hygiene." This woman, exposed to the very influence, that induced the scorbutic condition, during lactation had sore mouth—this sore mouth was habitual with her when in this condition. But there is scarcely a symptom of scurvy mentioned in the history of her case, and if vegetables had not been scarce that season, I doubt whether even Dr. Knapp would have found any scurvy in the case. The second case occurring under similar circumstances as to hygiene, does present some of the signs of scurvy, such as "gums parted from the teeth, soft, spongy and bleeding, teeth loose and reclining;" no purple or ecchymosed spots, however, are mentioned; and these, so far as I know, are invariable attendants of scurvy. That individuals subjected to the causes of scurvy, should have some of the symptoms of scurvy, and that a nursing woman if scorbutic, should have a sore mouth, I can readily comprehend. But to infer from this, that stomatitis materna and scurvy are identical, or that the former is an indication of the latter, seem to me too absurd to merit serious refutation. Such hasty and fanciful generalization, can only be productive of mischief, and lead the inexperienced into error. It should be scouted by all considerate men.